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(54) **Use of manganese compounds to inhibit both low- and high-temperature corrosion in utility and industrial furnace systems**

(57) The present invention relates to the reduction or inhibition of corrosion in an atmospheric burner unit by adding to a combustion system an effective amount of manganese, or a manganese precursor source, or derivative. The system may further include a catalyst package that may be composed of one or more individual organometallic compounds of Li, Na, K, Mg, Ca, Sr, Ba, Mo, Fe, Co, Pt, Ce, and combinations, mixtures or precursors thereof. The manganese component of the

catalyst package of the present invention reduces or eliminates the poisoning of the combustion system, whereby improved combustion and reduced emissions result. In addition, this invention inhibits both high- and low-temperature corrosion that occurs on the hot surfaces of burner furnace walls and tubes, and on cooler surfaces of the burner unit exhaust stack.

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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 2906

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 3 692 503 A (KUKIN IRA) 19 September 1972 (1972-09-19) * column 1, line 36 - line 51 * * column 2, line 24 - column 3, line 11; claim 1 *	1-3, 11-13	C10G75/02 C10L1/12
X	GB 1 061 161 A (BASIC INC) 8 March 1967 (1967-03-08) * page 1, line 10 - page 2, line 25 * * page 3, line 82 - line 91; claims 1,7 *	1-4,6, 11-13	
X	FR 2 502 300 A (GAILLARDIN JACQUELINE) 24 September 1982 (1982-09-24) * claims 1,6 *	1	
X	US 2 943 925 A (AMBROSE HENRY A) 5 July 1960 (1960-07-05) * column 1, line 23 - line 36 * * column 2, line 55 - line 70 * * column 3, line 23 - line 46; claim 1; figure 1 *	4,11-13	
X	GB 1 189 356 A (APOLLO CHEMICAL CORPORATION) 22 April 1970 (1970-04-22) * page 1, line 11 - line 49 * * page 2, line 69 - line 80 * * page 3, line 65 - line 69; claim 1 *	1-4,6, 11-13	C10G C10L
X	US 4 512 774 A (LOGAN DOUGLAS P ET AL) 23 April 1985 (1985-04-23) * claims 1,8 *	4,6, 11-13	
<p>The present search report has been drawn up for all claims</p>			
Place of search The Hague		Date of completion of the search 9 June 2004	Examiner Deurinck, P
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			



European Patent
Office

Application Number

EP 03 02 2906

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-3, 11-13



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3, 11-13

a method to inhibit corrosion of a combustion unit
combusting a fuel

1.1. claims: 4, 11-13 (all in part)

a method of reducing the amount of vanadium in the fly ash
by adding to the fuel an amount of a source of manganese

1.2. claims: 6, 11-13 (all in part)

a method of reducing the amount of sulfur in the fly ash by
adding to the fuel an amount of a source of manganese

2. claims: 4, 11-13 (all in part)

a method of reducing the amount of vanadium in the fly ash
by adding to the combustion products an amount of a source
of manganese

3. claims: 5, 11-13 (all in part)

a method of reducing the amount of iron in the fly ash by
adding to the fuel an amount of a source of manganese

4. claims: 5, 11-13 (all in part)

a method of reducing the amount of iron in the fly ash by
adding to the combustion products an amount of a source of
manganese

5. claims: 6, 11-13 (all in part)

a method of reducing the amount of sulfur in the fly ash by
adding to the combustion products an amount of a source of
manganese

6. claims: 7, 11-13 (in part)

a method for improving the effectiveness of one or more
fuel-borne organometallic emissions control catalysts

7. claims: 8, 11-13 (in part)



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 03 02 2906

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

a method to passivate metal surfaces containing Fe₂O₃

8. claims: 9, 11-13 (in part)

a method to inhibit the oxidation of Fe₃O₄ to Fe₂O₃

9. claims: 10, 11-13 (in part)

a method of increasing the efficiency of an electrostatic
precipitator

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 02 2906

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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09-06-2004

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FR 2502300	A	24-09-1982	FR 2460317 A1 FR 2502300 A2	23-01-1981 24-09-1982
US 2943925	A	05-07-1960	NONE	
GB 1189356	A	22-04-1970	NONE	
US 4512774	A	23-04-1985	AT 6266 T AU 530423 B2 AU 5380979 A CA 1135961 A1 DE 2966695 D1 DK 538879 A EP 0013243 A1 HK 51085 A IE 49342 B1 JP 55090588 A ZA 7906981 A	15-03-1984 14-07-1983 03-07-1980 23-11-1982 22-03-1984 28-06-1980 09-07-1980 12-07-1985 18-09-1985 09-07-1980 29-07-1981

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82